



Transition out of Marriage and its Effects on Health and Health-Related Quality of Life among Females and Males. COURAGE and COURAGE-POLFUS–Population Based Follow-Up Study in Poland

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Abstract

The study explores short-term effects of dissolution of union through divorce/separation and widowhood on physical and mental health as well as health-related quality of life (HRQoL) among females and males in Poland. Considering social selection and social causation theories, the study poses following research questions: are there differences in physical and mental health as well as health-related quality of life that are caused by a marital transition compared to remaining married/cohabiting? Do marital status transitions have different effects concerning physical and mental health and health-related quality of life among females and males? Data for the analysis were available for 1073 people (18+) who participate in the COURAGE-Poland population-based study from 2011 (baseline) and 2015–2016 COURAGE-POLFUS (follow-up). Health status was measured by the WHODAS II and the presence of depression based on the Composite International Diagnostic Interview. Health-related quality of life was assessed by WHOQOL-AGE scale. The analysis has been conducted using the analysis of variance, multinomial logistic regression and generalized liner mixed model according to the dependent variable. Results do suggest that transition out of marriage weakens mental health although the differences in physical health seemed to not be significant compared to the continuously married/cohabiting. The marital dissolution especially causes a decline in the mental health as well as health-related

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quality of life of males who transitioned to a widowed life. There has not been observed statistically significant change in terms of health-related quality of life between first and second wave of the survey among both widowed and divorced males and females.

Keywords Transition out of marriage · Physical health · Mental health · Health-related quality of life · Gender differences

Introduction

In the last few decades, the family structure in Western European countries has experienced many changes. Sociologists have pointed out, among others, the increase of cohabitation (Kasearu and Kutsar 2011; Perelli-Harris et al. 2014), delayed marriages and the rise of non-marital childbearing, as well as the increase of divorce rates (Amato 2010; Schoen et al. 2007). The same patterns have occurred recently in Poland as according to the Central Statistical Office, approximately 30% of Polish marriages established currently lead to divorce (Demographic Yearbook of Poland 2017). Additionally, Polish sociologists indicate that informal relationships are becoming more and more popular especially among young people who do not have previous marital experiences (Szukalski 2013).

The phenomena concerning the family structure mentioned have a strong influence on individuals' health as a family provides economic, social and psychological resources (Carr and Springer 2010). According to numerous studies, married individuals are shown to have lower rates of chronic illness, physical limitations and mortality, and, in general, better health than non-married people (Pienta et al. 2000; Rogers 1995; Williams and Umberson 2004; Williams et al. 2010). Those continuously married also appear to have better mental health than their unmarried counterparts (Lamb et al. 2003; Soons and Kalmijn 2009; Wade and Pevalin 2004; Zella 2017). Marriage as well as cohabitation convey protective health benefits by increasing the availability of social support, stability of life and mutual monitoring of health behaviours (Zella 2017). Being in an intimate relationship is also responsible for a better quality of life (Naess et al. 2015) because marriage and cohabitation may bring satisfaction in sexual activity, companionship and sharing household resources (Lucas 2008), support and mutual caring, as well as economic benefits (Argyle 1999).

Nevertheless, the costs to the mental health of exiting marriage through divorce or widowhood seem to be substantially stronger compared to the mental health benefits of marriage entry (Musick and Bumpass 2010; Wu and Hart 2002). The evidence of this thesis are numerous longitudinal studies (Kim and McKenry 2002; Lee and DeMaris 2007; Simon 2002; Strohschein et al. 2005; Wade and Pevalin 2004; Wilcox et al. 2003; Williams 2003; Wu and Hart 2002) which show that divorces and widowhood are associated with the substantial decline in mental health. Scholars indicate, among others, the decline of mental health, the growth of depression, anxiety and also alcohol abuse (Chen et al. 1999; Horwitz et al. 1996; Kim and McKenry 2002; Simon 2002).

Theoretical Background of Current Research

There are two main approaches explaining relationships between marital status transition and health. Firstly, the social causation theory which suggests that there are aspects of being married/cohabitant that make it advantageous to health in comparison with single life (Williams and Umberson 2004). The social causation model argues that marital partnerships protect people in ways that are beneficial to psychological health and occupying the role of a widowed or divorced person increases the likelihood of mental health problems because of the strains that accompany a marital disruption (Umberson et al. 2009). The other causation argument claims that partnership transitions affect people's health which can be short-lived or may persist. However, after a temporary decline in health following a transition out of marriage, the health of the divorced or widowed person should be no different from that of a married person. Using three waves of data from the United States collected between 1980 and 1988, Booth and Amato claimed (1991) the level of psychological distress increases just prior to marital dissolution, remains elevated up to 2 years and finally returns to the level reported by those who are continually married. Similarly, Hope et al. (1999) found elevated levels of psychological distress only relatively shortly after a marital dissolution. Using the same data as Booth and Amato (1991), but with a fourth wave added, Johnson and Wu (2002) reported on the other hand that the effect of divorce on psychological distress does not appear to diminish over the years following divorce.

The second perspective – the social selection theory – informs us that healthy people are selected into marriage/cohabitation as desirable partners, whereas the unhealthy remain single (Wu et al. 2012). In other words, people in poor health are less likely to marry and are more likely to divorce than people in good health. This paradigm also means that people that have some psychological traits such as extraversion, optimism and emotional stability are characterized by a higher rate of life satisfaction than those who are unattached (Naess et al. 2015). The social selection perspective would also argue that the formerly married exhibit poorer health than married people and are consequently more likely to experience dissolution and less likely to make a transition into remarriage (Marks and Lambert 1996). Blekesaune (2008) showed that poor mental health precedes marital dissolution and Mastekaasa (1994) also found evidence that poor psychological well-being forebode marital dissolution over a 2- to 4-year period. Additionally, Gardner and Oswald (2006) found that mental distress can predict marital disruption 1 and 2 years later in 11 waves of the British Household Panel Survey (BHPS) whereas Wade and Pevalin (2004) using the same tool supported the social selection model, but only in a group of divorced/separated, yet not among the widowed. They claimed that mental health problems among the divorced measured 4 years previously are predictive of marital disruption. In the context of cohabitation, Pevalin and Ermisch (2004) found that high levels of mental distress increased the probability of exiting cohabitations.

Divorce, separation or widowhood are treated as stressful life events because these situations require an adjustment to a new way of living from an individual (Dupre and Meadows 2007; Ensel et al. 1996; Zisook and Shuchter 1991). According to Pearlin (1989), there are two major types of social stressors: life events and chronic strains. Firstly, the stress of life events is associated with life events originating in negative situations and refers to changes that are undesired, unscheduled, non-normative and

most harmful, such as widowhood. According to the Social Readjustment Rating Scale developed by Holmes and Rahe (1967) which measures the presumed relationship between stress and particular life experiences, the death of a spouse is ranked the highest with a relative stress value of 100 and divorce is second with a value of 73. Secondly, there are chronic strains including persistent problems, conflicts and threats that many people face in their daily lives (e.g., economic hardship, single parenting, social isolation) that lead to persistent psychological distress. These kinds of strains may develop insidiously and may persist until people readjust to the new expectations and norms. However, as Pearlin (1989) states, these two kinds of stressors often flow together in people's experiences. In this perspective, divorce/separation and widowhood could be considered as life events stressors, but also strains can precipitate transitions out of marriage regarded as stressful events. These findings are interrelated with the shock theory that claims that after widowhood and divorce a temporary decline of hardiness occurs, which is the result of the lack of benefits coming from having a life partner. As a consequence, the necessity of redefining social roles considered to be a very stressful experience emerges (Birch 1997).

The other useful explanation for stress phenomena connected with the transition out of marriage is provided by the socio-emotional selectivity theory developed by Carstensen (Carstensen 1992). According to this paradigm, although there are reductions in social contacts with acquaintances across the life span, interactions in significant relationships increase. In other words, over the adult life course interactions with social partners from whom an individual derives affective gains are more frequent, whereas relations providing fewer emotional rewards and being less satisfying become less frequent. In the context of intimate unions, this theory suggests that marriage is becoming more important to older people as they begin to narrow down their social networks. As a consequence, if the marital relationship becomes more salient to individuals at later ages, exiting from it undermines health more strongly compared to younger adults.

The final important approach concerning marital status change and health is the social role theory (Ross 1995). According to this paradigm, the greater psychological distress reported by the divorced person is the result of the more difficult life circumstances they experience. Living as a divorced individual often involves social isolation, lack of social support, economic hardship and added childcare responsibilities for those who are parents. The greater distress levels of divorced people considered as a permanent feature of that state could be reduced by entering into remarriage or cohabitation (Ross 1995).

Previous Research Concerning Relationship between Transition out of Marriage, Health and Gender

In the context of physical health in relation to gender, research indicates that marital dissolution undermines men's health, but not women's (Williams and Umberson 2004; Wu and Hart 2002). The negative health behaviour observed by scientists after marital break-up includes the increased risk of alcohol consumption among men (Wu and Hart 2002), as well as tobacco use (Umberson 1992), whereas smoking (Rydzewski 2010) and loss of weight have been noticed among women (Umberson 1992).

The mental health effects of marital break-up, either due to divorce or widowhood mostly encompass the occurrence of anxiety and depression among both females and males. However, the results of studies whether men or women suffer more after divorce/separation are inconsistent. Some research suggests that women may be psychologically more vulnerable than men to a marital status transition (Horwitz et al. 1996; Simon 2002), whereas other research indicates that exiting marriage has a more adverse effect on the mental health of men than women (Carr 2004; Williams 2003). This discrepancy may be the result of using samples in studies that differ in the length of time divorced and in the choice of control variables (Umberson et al. 2013).

In the context of widowhood and gender, the results of research are more consistent in terms of showing more adverse mental health consequences for men than for women (Stroebe et al. 2001; Umberson 1992; Umberson et al. 1992). Additionally, research analyzing the short-term influence of marital status transition on mental health indicated that depressive symptoms observed among women in longitudinal explorations have not differed than men's in short-term research. As scholars inferred, the worse mental condition of women in the long-term perspective was not necessarily caused by marital status transition, but rather by such factors as the decline of socio-economic status after a spouse's death or becoming a single parent. This study also indicated that the level of psychological anxiety among divorcees and widowers is on average 36% higher compared to people whose marital status has not changed (Strohschein et al. 2005).

In Poland, a limited amount of research has been conducted with regard to the correlation between marital status transition and health, as well as life satisfaction. It has been shown that both divorced females and males assess their health condition as worse compared to married people. The results of Rydzewski's study using the data from the 1990s showed that married people were characterized by a higher mental health state compared to divorced people. Moreover, divorcees were characterized by a lower self-assessment of the quality of life measured by factors such as life satisfaction and life optimism, while it turned out that among divorced people, there were only 10.9% of fully life optimists compared to 19.6% in the group of married people. These declarations changed, albeit slowly, over the years because in the first decade of the twenty-first century the rate of unhappy and quite unhappy people among those married and divorced was 10.8% and 39.2% respectively. By comparison, during the 1990s, the rate of unhappy and quite unhappy among married and divorced was 16.6% and 47.5% respectively. However, the differences between women and men in terms of physical and mental consequences of divorce have not been observed (Rydzewski 2010), which did occur in the case of a spouse's death. According to other research, the death of a spouse causes more mental and physical problems among men than women (Tobiasz-Adamczyk 2009). It has also been noted that divorce is associated with less negative effects on health condition compared to a spouse's death because 84% of widowers reported health problems in comparison with 63% of divorcees (Raciborski 2012). In turn, Szukalski's study (Szukalski 2007) indicated that the rate of mortality was higher among those divorced and widowed than among those continually married, regardless of their age.

There is no previous research which particularly concerns the correlation between marital status change and the quality of life, although the relationships between marital status transitions and life satisfaction (Chipperfield and Havens 2001; Gustavson et al. 2012; Lucas 2005; Naess et al. 2015) or subjective well-being (Kamp Dush and Amato

2005; Soons et al. 2009) were explored. Referring to these studies, it could be stated that people in marriage/cohabitation are characterized by a higher rate of life satisfaction than those unattached (Chipperfield and Havens 2001; Kamp Dush and Amato 2005; Naess et al. 2015; Soons et al. 2009). In the case of marital transition, widowed and divorced people are characterized by a lower rate of life satisfaction compared to those who are still married (Gustavson et al. 2012; Naess et al. 2015). In turn, among widowers' life satisfaction is lower than their female counterparts (Chipperfield and Havens 2001; Naess et al. 2015).

In our research we use health-related quality of life (HRQoL) defined as the degree of satisfaction or dissatisfaction felt by people with regard to various aspects of their lives (Bowling 2001). The previous studies showed that the terms *subjective well-being* and *life satisfaction* used in relation to marital status change measured only psychological quality of life (Medvedev and Landhuis 2018). In the context of life satisfaction Chipperfield and associates (Chipperfield and Havens 2001) used, for instance, LSIA index consisted of 20 items, designed to measure five dimensions of life satisfaction: zest for life; resolution and fortitude; congruence between desired and achieved goals; positive self-concept and mood tone. Gustavson and colleagues (Gustavson et al. 2012) used, in turn, the five-item satisfaction with life scale (SWLS), whereas life satisfaction in Naess et al. research (Naess et al. 2015) was measured by single-item question: 'Considering how you feel these days, are you generally satisfied with your life, or are you generally dissatisfied?' (seven-step bipolar scale varying from very satisfied to very dissatisfied). Subjective well-being in Kamp Dush and associates' research (Kamp Dush and Amato 2005) was assessed with four measures: life satisfaction, general happiness, distress symptoms and self-esteem.

HRQoL, in our view, is the broader concept than previously mentioned as it encompasses the physical (ability to perform daily activities and physical roles, impaired function, pain), psychological (depression, anxiety, well-being) and social (relationships with others, social support and engagement in social activities) domains of health (Bowling 1997, 2001; Raggi et al. 2016). Social well-being as a key component of this paradigm is understood as the possibility of receiving both emotional and practical support which is satisfying for an individual (Tobiasz-Adamczyk 2013). Additionally, the health-related quality of life perspective was not previously analyzed in the context of marital status change therefore our research is the contribution to current studies concerning this topic.

In terms of the theory used with relation to life satisfaction/well-being and change in the marital status, the results of previous studies are inconsistent. According to some of them, the social selection theory is more useful because the lower level of life satisfaction among divorcees is due to the greater tendency of less satisfied people to getting divorced (Lucas 2005; Naess et al. 2015). Other reports show greater support for the social causation theory in the context of subjective well-being claiming that the transition to separation/divorce or widowhood is associated with the negative effects across a number of dimensions of well-being (Kamp Dush and Amato 2005; Marks and Lambert 1996). In turn, Gustavson et al. (2012) in their longitudinal explorations found support for both the causation and the selection theories showing that divorced people were characterized by the significantly lower levels of life satisfaction than those who had stayed together, yet not lower than people having new partners. In conclusion, they stated that the negative association between divorce and life satisfaction could be partially explained by selection effects.

Main Research Questions

The aim of this study is to analyze the association between transition out of marriage, physical and mental health as well as health-related quality of life among Polish females and males. Transitions are defined by us as movements out of marital status, which mark important changes in identity or social roles (Dupre and Meadows 2007).

Our research explores the short-term effects of marital status change considered as a stressful life event on physical and mental health, as well as HRQoL. Stress is defined by us as an individual's general feeling of upset or unease as a response to a traumatic life event – widowhood or divorce/separation (Miller et al. 1998). The study is focused on two types of marital transition: 1) married/cohabiting into divorced/separated, 2) married/cohabiting into widowed. We decided to combine marital and cohabiting couples into one category due to three main reasons. Firstly, in our research the percentage of cohabitants turned out to be very low; secondly, there is an increased rate of informal relationships in modern-day Poland, as has been mentioned previously; thirdly, these two types of unions could be considered as comparable because, as previous research indicates, both marriage and cohabitation have a protective effect against bad health (Wu et al. 2012; Zella 2017).

Previous research clearly showed that there is still a lot to discover about the correlation between transition out of marriage, health and HRQoL among females and males. It is also worth mentioning that the majority of previous studies concerning relationship between transition out of marriage and health have been conducted in Western countries, especially in the Anglophone context, whereas our research refers to Eastern Europe (Poland) which has not been sufficiently explored in terms of such a phenomenon. Another advantage of this study is the fact of taking account of the factors encompassing both the physical and mental health of our respondents. Thus, the main research questions are as follows:

1. Are there differences in physical and mental health, as well as health-related quality of life that are due to making a marital transition, i.e. from married/cohabiting to separated/divorced status, married/cohabiting to widowed status compared to the remaining married/cohabiting?
2. Do marital status changes, such as divorce/separation and widowhood have different effects concerning health and HRQoL among females and males?

Methods

Selection of Participants

The data comes from the first and the second wave of the COURAGE–Poland population-based study from 2011 (baseline) (Leonardi et al. 2014; Miret et al. 2014) and 2015–2016 COURAGE-POLFUS (follow-up). Participants were randomly selected from a non-institutionalized adult population (18+) based on the multi-stage clustered design with the oversampling of adults aged 50–79 years and > 80 years. In total, 4071 Polish citizens agreed to participate in the first wave of the study (the response rate was 66.5%). Overall, 1850 respondents participated in the second wave.

In both waves, face-to-face interviews were conducted at the homes of respondents by specially trained interviewers. The study was approved by the Bioethical Committee, Jagiellonian University, Krakow, Poland (No. KBET/208/B/2010; No. 122.6120.26.2015).

We explored a group of 1073 people who were married or cohabiting during the first wave of the study and had changed their marital status prior to the second wave because of a divorce or separation (together as a category that transitioned to a divorced life) or because of becoming widowed (as a category that transitioned to a widowed life/widowhood). Likewise, a group of people who have not changed their marital status and who reported being married or cohabiting (the percentage of cohabited participants was 2.98%) was analyzed in both waves, which is included in the analysis (as a category of those continuously married). We will use the names: Transitioned to a divorced life; Transitioned to a widowed life and Continuously married to refer to these categories. The variable we called ‘marital status change’ with abbreviation MSC. The selection of participants is presented in Fig. 1.

Measurements

Dependent Variables

WHO Disability Assessment Schedule (WHODAS II) 12-item version was used as a generic measure of health and disability assessment (Üstün et al. 2010). It was based on the ICF biopsychosocial conceptual model and the global score covers six domains of

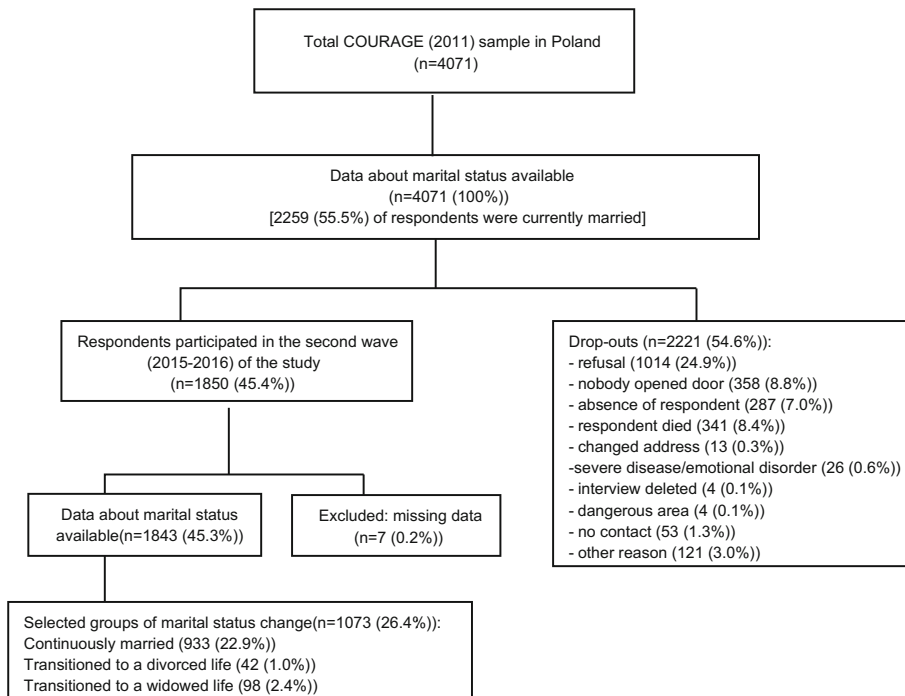


Fig. 1 The selection of participants

functioning: cognition, mobility, self-care, getting along, life activities and participation. Items assessed the level of difficulties in relation to aforementioned domains of functioning. Responses for every item were “none”, “mild”, “moderate”, “severe” and “extreme”. The final score was calculated by the sum of the scores of the items across all domains according to the WHO guidelines and then converting into a metric ranging from 0 to 100 points, where higher score means higher level of disability (WHODAS 2.0.).

The presence of depression was assessed based on the Composite International Diagnostic Interview (Haro et al. 2006) and the DSM–IV criteria for Major Depressive Disorder (American Psychiatric Association 1994). Based on the data from both waves, variables with the following categories were created: 1 – depression present in the first wave, yet not in the second, 2 – the reverse, 3- depression present in both waves, 4 – respondents had no symptoms and were not diagnosed for depression at the time of the survey.

Current study contributes to the current knowledge the WHOQOL tool regarded as a measure of HRQoL. This instrument was developed as an international multi-dimensional tool reflecting the holistic approach to health and health care. It covers six dimensions such as physical and psychological domains, level of independence, social relationships, environment and spirituality/ religion/ personal beliefs (THE WHOQOL GROUP 1995). The health-related quality of life was measured by the Polish version of thirteen items of the WHOQOL–AGE scale. The tool contains items from EUROHIS-QOL (items related to the following domains of quality of life: physical, psychological, social relationships and environment) and WHOQOL-OLD (items related to the following domains of quality of life: sensory abilities, autonomy, past, present and future abilities, social participation and intimacy) scales (Dalgard 1996; The WHOQOL Group 1998), (Power et al. 2005; Zawisza et al. 2014). The final score ranged from 0 to 100 points, whereby a higher score of WHOQOL–AGE is interpreted as better health-related quality of life (Caballero et al. 2013; Zawisza et al. 2016).

Covariates

The structure of social networks was measured by the COURAGE Social Network Index (COURAGE-SNI) developed as a multi-dimensional instrument which assesses elements of the functionality of social networks (frequency of direct contact, ties and social support) in eight structural components (spouse or partner, parents, children, grandchildren, other relatives, neighbours, friends and co-workers) (Zawisza et al. 2015).

The prevalence of angina, arthritis, asthma and chronic obstructive pulmonary disease were analyzed based on algorithms while taking account of the diagnosis and symptoms (Moussavi et al. 2007). The prevalence of diabetes and stroke symptoms was estimated based on self-reported data about the diagnosis of these diseases. Additionally, an injury was considered as a disease when respondents who had injury and suffered a physical disability as a result of being injured in the last 12 months. For further analysis respondents were grouped on the basis of their disease status into two categories: respondents had some of the afore-mentioned conditions or had none of them.

Socio-demographic characteristics included the following: gender, age, level of education (primary education, vocational or high school, university degree), total household income per person per year in 1000 Euro and area of residence (urban, rural).

Statistical Analysis

In order to find differences in socio-demographic and health characteristics between three marital status change categories, Pearson chi-square tests were used for factorial variables and Kruskal-Wallis or U Mann-Whitney tests for continuous ones. In order to see whether the changes of quality of life or health and disability assessment during the follow-up are significant, paired *t* tests were used. Variables significantly differentiate the MSC categories were considered as covariates for further analysis.

In the case of health and disability assessment, the normal distribution assumption was violated because of strong right skewness. Therefore, the Generalized Linear Mixed Model (GLMM) was used to assess the changes and differences of disability assessment between the categories of marital status change.

Multinomial logistic regression was conducted to see whether marital status change is somehow connected with getting depression. Significance of the differences between men and women in regression coefficients were also tested (Allison 1999).

Then, an analysis of the variance of quality of life was conducted as ANOVA mixed effects models with repeated measure to compare the changes and differences of quality of life between MSC categories. While not every model meets the assumption of normal distribution, the sizes of the samples were sufficiently big for such cases to let us analyze them. In the case of obtaining a significant effect post-hoc Bonferroni tests or pairwise comparisons with Bonferroni correction were analyzed.

The analysis was conducted in the following steps: 1. unadjusted model; 2. model adjusted for gender and age; 3. model adjusted for gender, age, the level of education and disease diagnosis; and the final step; 4. model adjusted for variables from step 3 and the level of social network. Subsequently, the analysis of interactions between MSC and considered covariates was performed.

Analyses were conducted with SPSS 24 and R 3.4.3. The adopted level of significance is 0.05.

Results

Characteristics of Respondents

Table 1 presents the characteristics of respondents for three categories of marital status change. The size of the analyzed sample is 1073, where 87% are continuously married, 9.1% are transitioned to widowhood and 3.9% are transitioned to a divorced life. The group of people who got divorced/separated is on average the youngest, while continuously married are in the middle and those who got widowed are the oldest. Divorced/separated and continuously married people are better educated than the widowed. The frequency of people diagnosed with a chronic disease is 36% among those who transitioned to a divorced life, 50% of the continuously married, while much higher

Table 1 Characteristics of respondents according to socio-demographics, health and psychosocial factors at baseline (2011) and in the second wave (2015–2016) for groups of marital status change between waves

Group	Category	Transitioned to a divorced life		Transitioned to a widowed life		Continuously married		P
		N	%	N	%	N	%	
Gender	Male	21	50.0	26	26.5	433	46.4	.001 ²
	Female	21	50.0	72	73.5	500	53.6	
Age group	18–49	18	42.8	2	2.0	230	24.7	<.001 ²
	50–64	21	50.0	34	34.7	439	47.1	
	65–79	2	4.8	45	45.9	222	23.8	
	80+	1	2.4	17	17.3	42	4.5	
Age (1st wave)		49.05 (45.47; 52.63)		69.43 (67.41; 71.44)		56.61 (55.69; 57.53)		<.001 ^{3a}
Education	Primary education or lower	5	11.9	44	44.9	194	20.8	<.001 ²
	Vocational education or high school	28	66.7	46	46.9	537	57.6	
	University degree or higher	9	21.4	8	8.2	200	21.4	
Income (1st wave)		3.35 (2.22; 4.48)		3.41 (2.97; 3.84)		4.24 (3.36; 5.12)		.333 ³
Area of residence (1st wave)	Urban	21	50.0	58	59.2	480	51.4	.332 ²
	Rural	21	50.0	40	40.8	453	48.6	
Social network (1st wave)		63.71 (59.70; 67.71)		64.72 (61.95; 67.49)		69.57 (68.83; 70.31)		<.001 ^{3c}
Chronic disease	No	27	64.3	27	27.6	459	49.2	<.001 ²
	Yes	15	35.7	69	70.4	460	49.3	
Health and disability assessment	1st wave	7.94 (4.09; 11.79)		21.61 (17.20; 26.01)		13.14 (12.01; 14.27)		<.001 ^{3b}
	2nd wave	11.90 (7.34; 16.47)		22.16 (17.63; 26.69)		13.90 (12.73; 15.06)		<.001 ^{3b}
t ^{1#}	P value from paired t test	.076		.825		.174		

Table 1 (continued)

Group	Category	Transitioned to a divorced life		Transitioned to a widowed life		Continuously married		P
		N	%	N	%	N	%	
Depression	Yes – only in 1st wave	1	2.4	6	6.1	39	4.2	.001 ²
	Yes – only in 2nd wave	8	19.0	11	11.2	44	4.7	
	Yes – both in 1st and 2nd wave	0	0.0	3	3.1	22	2.4	
	Never	33	78.6	66	67.3	765	82.0	
Health- related quality of life ^{1#}	1st wave	68.27 (64.83; 71.70)		60.07 (56.89; 63.24)		67.15 (66.29; 68.00)		<.003 ^b
	2nd wave	68.67 (63.82; 73.53)		62.15 (58.69; 65.62)		68.89 (67.94; 69.84)		
	P value from paired t test	.862		.291		.001		

P–p values for tests based on comparison of three categories: Transitioned to a divorced life, Transitioned to a widowed life and Continuously married

¹ Mean value with 95% confidence upper and lower limits

² P value from Pearson chi-square test

³ P value from Kruskal-Wallis test

Values restricted to observations for which data from both waves are available

^a All pairs are significantly different ($p < .05$)

^b Significantly different pairs ($p < .05$) are: Transitioned to a widowed life-Transitioned to a divorced life and Transitioned to a widowed life-Continuously married

^c Significantly different pairs ($p < .05$) are: Transitioned to a divorced life-Continuously married and Transitioned to a widowed life-Continuously married

^d The only significantly different pair ($p < .05$) is Transitioned to a widowed life-Continuously married

among those widowed (70%). Continuously married people have got a significantly higher social network level than the other two groups (at about 5–6%), while the difference between transition to divorced/separated and transition to widowed group is not significant. On the other hand, there are no significant differences in the area of residence and income per person among all three MSC categories.

Transition out of Marriage and its Effect on Physical Health and Disability Assessment

Disability assessment is much higher in the case of those transitioned to widowhood compared with other two MSC categories, while those transitioned to a divorced life and continuously married do not differ significantly (Table 1). The mean values are the lowest for the divorced/separated in both waves (7.94; 11.90), while they are much higher for widowed people (21.61; 22.16). However, the effect of marital status change on health and disability assessment is not significant in any of the analyzed models (Table 2).

Males and females neither differ significantly in health and disability assessment among divorced/separated, nor among those widowed and continuously married (Table S1). However, those who are widowed have a significantly worse disability assessment than the other two MSC categories among both females and males before their marital status change, whereas only among females after marital status change (Table S1). Neither gender effect, nor the interaction of MSC and gender are significant in the context of disability assessment (Table 2).

Additional analysis showed that the disability assessment increases with the increasing age for every MSC category (Table S2) and decreases with the increasing level of education (Table S3). Diagnosis of chronic disease results in higher disability assessment compared to a group without any disease and differences between them are approximately equal to 10 units among those transitioned to a divorced life, 15 units among those continuously married and even 20 units among those widowed, which is similar in both waves (Table S4). However, the interactions of MSC with age, education level and diagnosis of disease are not significant in the context of disability assessment.

Transition out of Marriage and its Effect on Depression as an Indicator of Mental Health

Marital status change categories differ significantly in depression. Depression occurred among less than 5% of those married (in both waves), while it was about 2.5 times more frequent among those widowed and over 4 times more frequent among those transitioned to a divorced life after their marital status change (2nd wave), as shown in Table 1.

Logistic regression analysis (Table 3) indicates that the risk of getting depression after marital status change increases both because of becoming divorced/separated (OR = 5.1 in a fully adjusted model) and becoming widowed (OR = 2.2), even if we include gender, age, education level, chronic disease diagnosis and social network as covariates. Noticeably, the odds ratio in the case of divorced/separated is more than twice as large as in the case of widowed. The interactions of MSC with gender, age, education level, chronic disease diagnosis and social network are all insignificant in the context of depression diagnosis (Table 4).

Table 2 Results of generalized linear mixed models of health and disability assessment

		GLMM		
Model number	Factor / Interaction	Type of effect	F	p
1	MSC	BSE	2.49	.115
1a	MSC	BSE	2.68	.102
	Gender	BSE	0.41	.524
1b	MSC	BSE	0.00	.965
	Gender	BSE	0.66	.417
	Age	BSE	45.86	<.001
1c	MSC	BSE	0.12	.727
	Gender	BSE	0.26	.608
	Age	BSE	8.76	.003
	Education level	BSE	11.90	<.001
	Diagnosis of disease	BSE	55.95	<.001
	Number of wave * Age	WSE	6.77	.009
	Number of wave * Education level	WSE	11.89	.001
1d	MSC	BSE	0.01	.944
	Gender	BSE	0.50	.479
	Age	BSE	2.90	.089
	Education level	BSE	9.17	.003
	Diagnosis of disease	BSE	60.42	<.001
	Social network	BSE	2.72	.099
	Number of wave * Age	WSE	6.90	.009
	Number of wave * Diagnosis of disease	WSE	4.33	.038
2	MSC	BSE	3.42	.065
	Gender	BSE	0.02	.899
	MSC * Gender	BSE	2.17	.141
3	MSC	BSE	0.92	.337
	Age	BSE	37.28	<.001
	MSC * Age	BSE	1.00	.317
4	MSC	BSE	0.13	.714
	Education level	BSE	30.80	<.001
	MSC * Education level	BSE	0.42	.516
	Number of wave * Education level	WSE	30.80	<.001
5	MSC	BSE	0.07	.790
	Diagnosis of disease	BSE	69.33	<.001
	MSC * Diagnosis of disease	BSE	1.40	.237
6	MSC	BSE	0.12	.728
	Social network	BSE	4.97	.026
	MSC * Social network	BSE	0.00	.962

MSC Marital status change categories (Transitioned to a divorced life, Transitioned to a widowed life, Continuously married)

BSE Between-subjects effect

WSE Within-subject effect - for GLMM it includes effects of number of wave and effects of its interactions with other factors (only significant given)

F – value of test statistics

Table 3 Multinomial logistic regression of depression

Depression ^a	Factor / Interaction	1 ($R^2 = 0.029$; $p = .004$) ^b			1a ($R^2 = 0.035$; $p = .006$) ^b			1b ($R^2 = 0.03$; $p = .013$) ^b			1c ($R^2 = 0.101$; $p < .001$) ^b			1d ($R^2 = 0.112$; $p < .001$) ^b		
		OR	(95%CL) ^c	p	OR	(95%CL) ^c	p	OR	(95%CL) ^c	p	OR	(95%CL) ^c	p	OR	(95%CL) ^c	p
Yes – only in 1st wave	Transitioned to a divorced life	0.59	(0.08; 4.46)	.613	0.61	(0.08; 4.59)	.631	0.66	(0.09; 4.98)	.684	0.77	(0.10; 5.93)	.804	0.56	(0.07; 4.42)	.584
	Transitioned to a widowed life	1.78	(0.73; 4.37)	.206	1.61	(0.65; 3.97)	.301	1.43	(0.55; 3.69)	.461	1.38	(0.53; 3.61)	.509	1.23	(0.46; 3.25)	.680
	Continuously married (ref)															
	Male	.			0.56	(0.29; 1.07)	.078	0.53	(0.27; 1.03)	.060	0.50	(0.26; 0.98)	.044	0.51	(0.26; 1.00)	.050
	Female (ref)	.														
Yes – only in 2nd wave	Age	.			.			1.01	(0.99; 1.03)	.435	1.00	(0.97; 1.02)	.690	0.99	(0.96; 1.02)	.434
	Primary education	.			.			.			0.67	(0.24; 1.89)	.448	0.65	(0.23; 1.85)	.418
	Vocational/High school	.			.			.			1.13	(0.52; 2.48)	.762	1.12	(0.51; 2.48)	.772
	University degree (ref)	.			.			.								
	Disease – Yes	.			.			.			4.13	(2.10; 8.12)	<.001	4.18	(2.12; 8.21)	<.001
	Disease – No (ref)	.			.			.								
	Social network	.			.			.			.			0.96	(0.94; 0.99)	.005
	Transitioned to a divorced life	4.22	(1.84; 9.67)	.001	4.23	(1.84; 9.71)	.001	4.69	(2.01; 10.98)	<.001	5.38	(2.25; 12.80)	<.001	5.12	(2.10; 12.48)	<.001
	Transitioned to a widowed life	2.90	(1.43; 5.88)	.003	2.85	(1.40; 5.82)	.004	2.40	(1.12; 5.13)	.024	2.24	(1.04; 4.83)	.040	2.19	(1.01; 4.74)	.047
	Continuously married (ref)															
Male		.			0.92	(0.54; 1.56)	.753			.548	0.83	(0.48; 1.43)	.495	0.83	(0.48; 1.44)	.502

Table 3 (continued)

	1 ($R^2 = 0.029$; $p = .004$) ^b	1a ($R^2 = 0.035$; $p = .006$) ^b	1b ($R^2 = 0.039$; $p = .013$) ^b	1c ($R^2 = 0.101$; $p < .001$) ^b	1d ($R^2 = 0.112$; $p < .001$) ^b
Female (ref)			0.85 (0.49; 1.46)		
Age		.	1.01 (0.99; 1.04)	.212 1.00 (0.97; 1.02)	.778 1.00 (0.97; 1.02) .730
Primary education		.	.	1.31(0.55; 3.15)	.546 1.32 (0.55; 3.16) .539
Vocational/High school		.	.	1.21 (0.58; 2.53)	.620 1.21 (0.58; 2.55) .608
University degree (ref)		.	.		
Disease – Yes		.	.	3.23 (1.81; 5.77)	<.001 3.21 (1.80; 5.73) <.001
Disease – No (ref)		.	.		
Social network		.	.	.	0.99 (0.97; 1.02) .613
Transitioned to a divorced life ^d	–	–	–	–	–
Yes – both in 1st and 2nd wave					
Transitioned to a widowed life	1.74 (0.50; 6.00)	.382 1.62 (0.47; 5.67)	.447 1.45 (0.39; 5.39)	.578 1.28 (0.35; 4.77)	.709 1.26 (0.34; 4.71) .732
Continuously married (ref)	.				
Male	.	0.69 (0.29; 1.65)	.400 0.65 (0.27; 1.60)	.352 0.67 (0.27; 1.63)	.374 0.67 (0.28; 1.64) .380
Female (ref)	.				
Age	.	.	1.01 (0.98; 1.04)	.600 0.98 (0.95; 1.02)	.399 0.98 (0.95; 1.02) .382
Primary education	.	.	.	9.42 (1.09; 81.83)	.042 9.51 (1.09; 82.63) .041
Vocational/High school	.	.	.	.123 5.10 (0.65; 39.84)	.121

Table 3 (continued)

1	1a	1b	1c	1d
	($R^2 = 0.029$; $p = .004$) ^b	($R^2 = 0.035$; $p = .006$) ^b	($R^2 = 0.101$; $p < .001$) ^b	($R^2 = 0.112$; $p < .001$) ^b
		$p = .013$) ^b		
University degree (ref)	.	.	5.05 (0.65; 39.47)	
Disease – Yes	.	.		
Disease – No (ref)	.	.	2.16 (0.89; 5.27)	.093
Social network	.	.	.	1.00 (0.96; 1.03)
				.784

^a The reference category is: Never diagnosed and no symptoms of depression at the time of the survey
^b R^2 - Nagelkerke's r-square with p value from Likelihood Ratio Test of model fitting
^c OR (95%CL) - odds ratio with 95% confidence limits
^d OR and p value are not calculated for this category

Table 4 Multinomial logistic regression of depression with interactions with other factors. A category Divorced refers to Transitioned to a divorced life; Widowed refers to Transitioned to a widowed life; Married refers to Continuously married

2 (R ² = 0.046; <i>p</i> = .010) ^b P for interaction: .273		3 (R ² = 0.034; <i>p</i> = .106) ^b P for interaction: .962				
Depression ^a	Factor /Interaction	OR (95%CL) ^c	p	Factor /Interaction	OR (95%CL) ^c	p
Yes - only in 1st wave	Intercept	<.001		Intercept	<.001	
	Divorced ^d	—		Divorced	0.48 (0; 4213)	.874
	Widowed	1.89 (0.74; 4.82)	.181	Widowed	28.88 (0; 9720)	.257
	Married(ref)			Married(ref)		
	Male (1)	0.58 (0.29; 1.14)	.114	Age	1.01 (0.98; 1.03)	.542
	Female (ref)			Divorced* Age	1.01 (0.84; 1.20)	.952
	Divorced * (1) ^d	—		Widowed* Age	0.96 (0.88; 1.05)	.344
	Widowed * (1) ^d	—				
Yes – only in 2nd wave	Intercept		<.001	Intercept	<.001	
	Divorced	3.57 (1.12; 11.36)	.031	Divorced	2.06 (0.05; 91.21)	.710
	Widowed	1.82 (0.72; 4.63)	.207	Widowed	1.21 (0.01; 191.44)	.940
	Married(ref)			Married(ref)		
	Male (1)	0.73 (0.39; 1.36)	.316	Age	1.01 (0.99; 1.03)	.404
	Female (ref)			Divorced* Age	1.02 (0.95; 1.09)	.670
	Divorced * (1) ^d	1.46 (0.28; 7.73)	.665	Widowed* Age	1.01 (0.94; 1.09)	.770
	Widowed * (1) ^d	3.58 (0.84; 15.33)	.085			

Table 4 (continued)

		2 ($R^2 = 0.046$; $p = .010$) ^b P for interaction: .273		3 ($R^2 = 0.034$; $p = .106$) ^b P for interaction: .962	
Yes – both before and after MSC		Intercept	<.001	Intercept	<.001
	Divorced	–		Divorced	–
	Widowed	1.26 (0.28; 5.75)	.764	Widowed	0.18 (0; 2250)
	Married(ref)			Married(ref)	
	Male (1)	0.62 (0.25; 1.58)	.317	Age	1.00 (0.97; 1.04)
	Female (ref)			Divorced*Age ^d	–
	Divorced * (1) ^d	–		Widowed*Age	1.03 (0.90; 1.18)
	Widowed * (1) ^d	2.51 (0.18; 35.04)	.493		
		4 ($R^2 = 0.060$; $p = .024$) ^b P for interaction: .459		5 ($R^2 = 0.084$; $p < .001$) ^b P for interaction: .854	
Depression ^a	Factor /Interaction	OR (95%CL) ^c	p	Factor /Interaction	OR (95%CL) ^c
Yes - only in 1st wave	Intercept		<.001	Intercept	<.001
	Divorced ^d	–		Divorced	1.21 (0.15; 9.44)

Table 4 (continued)

	4 (R ² = 0.060; <i>p</i> = .024) ^b P for interaction: .459	5 (R ² = 0.084; <i>p</i> < .001) ^b P for interaction: .854			
Yes – only in 2nd wave	Widowed ^d	–	Widowed	1.03 (0.13; 8.01)	.979
	Married(ref)		Married(ref)		
	Primary edu. (1)	0.76 (0.26; 2.18)	Any disease (1)	3.48 (1.79; 6.75)	<.001
	High school (2)	0.98 (0.45; 2.15)	No disease(ref)		
	University (ref.)		Divorced * (1) ^d	–	
	Divorced * (1) ^d	–	Widowed * (1)	1.53 (0.15; 15.21)	.718
	Divorced * (2) ^d	–			
	Widowed * (1) ^d	–			
	Widowed * (2) ^d	–			
	Intercept		Intercept		<.001
	Divorced	2.31 (0.26; 20.49)	Divorced	3.61 (1.16; 11.26)	.027
	Widowed ^d	–	Widowed	1.54 (0.35; 6.87)	.570
Yes – both before and after MSC	Married(ref)		Married(ref)		
	Primary edu. (1)	1.26 (0.50; 3.19)	Any disease (1)	2.61 (1.41; 4.82)	.002
	High school (2)	1.02 (0.47; 2.23)	No disease(ref)		
	University (ref.)		Divorced * (1)	2.78 (0.44; 17.51)	.277
	Divorced * (1) ^d	–	Widowed * (1)	1.83 (0.33; 10.23)	.490
	Divorced * (2)	2.75 (0.25; 29.79)			
	Widowed * (1) ^d	–			
	Widowed * (2) ^d	–			
	Intercept		Intercept		<.001
	Divorced ^d	–	Divorced ^d	–	

Table 4 (continued)

4		5	
(R ² = 0.060; <i>p</i> = .024) ^b P for interaction: .459		(R ² = 0.084; <i>p</i> < .001) ^b P for interaction: .854	
Widowed ^d	—	Widowed	1.54 (0.19; 12.39)
Married(ref)		Married(ref)	
Primary edu. (1)	6.82 (0.81; 57.33)	Any disease (1)	
High school (2)	4.76 (0.62; 36.70)	No disease(ref)	2.17 (0.89; 5.29)
University (ref.)		Divorced * (1) ^d	—
Divorced * (1) ^d	—	Widowed * (1)	0.98 (0.07; 13.23)
Divorced * (2) ^d	—		
Widowed * (1) ^d	—		
Widowed * (2) ^d	—		
			.684
			.087
			.986

^a The reference category is: Never diagnosed and no symptoms of depression at the time of the survey^b R² - Nagelkerke's r-square with *p* value from Likelihood Ratio Test of model fitting^c OR (95%CL) - odds ratio with 95% confidence limits^d OR and *p* value are not calculated for this category

However, analysis of regression models 1 (unadjusted) and 1d (fully adjusted) conducted separately for males and females (Table 5) show that there is a difference between gender in terms of the risk of getting depression at the 2nd wave of the study. For males, the risk of getting depression after marital status change increases both because of getting divorced (OR = 6.3 in a fully adjusted model) and becoming widowed (OR = 6.4), while for females only because of getting divorced (OR = 5.1 in a fully adjusted model), but not because of becoming widowed (OR = 1.2 in a fully adjusted model).

Transition out of Marriage and its Effect on Health-Related Quality of Life

There are significant differences in the health-related quality of life between marital status change categories, as can be seen in Table 1 and presented in Fig. 2 and Fig. 3. The means of the health-related quality of life are the lowest for those transitioned to a widowed life in both waves (60.07 at the 1st wave; 62.15 at the 2nd wave), while they are much higher for those transitioned to a divorced life and those continuously married both in the first (divorced: 68.27; married: 67.15) and the second wave of the study (divorced: 68.67; married: 68.89). However, the change of the health-related quality of life between the 1st and 2nd wave is neither significant among those transitioned to a divorced life (difference equal to 0.4 unit; $p = .862$ from paired t test), nor among those transitioned to widowhood (2.08; $p = .291$) (Table 1). The significant effect of marital status change on the health-related quality of life was confirmed by the ANOVA models (unadjusted and adjusted for age and gender) but it may be eliminated by the effects of education level, chronic disease diagnosis or social network (Table 6).

The interaction between MSC and gender remains significant even in a fully adjusted model ($p = .017$ for the Model 2d). Males who transitioned to a divorced life have a lower quality of life than continuously married males, whereas those transitioned to a divorced life females have a higher quality of life than their continuously married counterparts, as shown in Table S1 and on Fig. 4. Additionally, after a complete adjustment, females transitioned to a widowhood tend to have a higher estimated quality of life than continuously married females, while males transitioned to a widowerhood have a much lower quality of life than the continuously married males, as depicted in Fig. 5.

Additional analysis showed that the health-related quality of life decreases with increasing age for every MSC category (Table S2) and increases with the increasing level of education (Table S3), whereas it is lower for groups with a diagnosis of any chronic disease and higher for groups without any disease (Table S4). Interactions of MSC with age, education level, chronic disease diagnosis and social network are all not significant in the analyzed health-related quality of life models (Table 6). Further analysis of the relationship between MSC and HRQoL at the baseline and in the second wave across gender groups was additionally considered and showed that after controlling for age and other covariates, the results are significant only among continuously married and widowed men in the case of the HRQoL measured during the follow-up. The results of the tests are presented in Tables S6 and S7.

Table 5 Multinomial logistic regression of depression - separately for females and males

	FEMALES				MALES			
	1	ld	p	ld	1	ld	p	ld
	(R ² = 0.026; p = .128) ^b	(R ² = 0.120; p = .001) ^b	(R ² = 0.060; p = .014) ^b	(R ² = 0.165; p = .002) ^b				
Depression	OR (95%CL) ^c	OR (95%CL) ^c	OR (95%CL) ^c	OR (95%CL) ^c	OR (95%CL) ^c	OR (95%CL) ^c	OR (95%CL) ^c	OR (95%CL) ^c
Yes - only at 1st wave								
Factor / Interaction								
Intercept	- d	<.001	.841	<.001	<.001	<.001	.588	.732
Transitioned to a divorced life								
Transitioned to a widowed life	1.89 (0.74; 4.82)	.181	1.31 (0.47; 3.63)	.601	- d	1.40 (0.14; 14.32)	.778	0.998
Continuously married (ref)						- d	- d	- d
Age	.		0.99 (0.96; 1.03)	.683	.	0.98 (0.94; 1.02)	.301	0.561
Primary education	.		0.99 (0.30; 3.32)	.987	.	- d	- d	- d
Vocational/High school	.		1.13 (0.42; 3.02)	.808	.	1.04 (0.27; 4.02)	.950	0.992
University degree (ref)	.				.			
Disease - Yes	.		2.98 (1.35; 6.61)	.007	.	9.59 (2.40; 38.37)	.001	0.152
Disease - No (ref)	.				.			
Social network	.		0.96 (0.93; 0.99)	.017	.	0.97 (0.93; 1.02)	.284	0.711
Intercept	<.001		.062	<.001	<.001		.107	0.935
Transitioned to a divorced life	3.57 (1.12; 11.36)	.031	5.11 (1.47; 17.77)	.010	5.221 (1.57; 17.31)	.007	6.29 (1.71; 23.16)	.006
Transitioned to a widowed life	1.82 (0.72; 4.63)	.207	1.21 (0.44; 3.28)	.715	6.5 (2.14; 19.92)	.001	6.39 (1.86; 21.95)	.003
Continuously married (ref)								
Age	.		1.00 (0.97; 1.04)	.813	.	0.98 (0.95; 1.02)	.371	0.410
Primary education	.		1.25 (0.38; 4.08)	.714	.	1.12 (0.29; 4.31)	.866	0.908
Vocational/High school	.		1.45 (0.55; 3.83)	.448	.	0.84 (0.26; 2.74)	.777	0.483
University degree (ref)	.				.			
Disease - Yes	.		3.32 (1.54; 7.18)	.002	.	3.36 (1.36; 8.29)	.009	0.986
Disease - No (ref)	.				.			

Table 5 (continued)

	FEMALES		MALES		
Yes – both at 1st and 2nd wave					
Social network	.	0.99 (0.96; 1.02)	.333	.	1.00 (0.97; 1.04)
Intercept		<.001	<.001		.825
Transitioned to a divorced life ^d	–	–	–	–	.096
Transitioned to a widowed life	1.26 (0.28; 5.75)	.764	.932	3.170 (0.37; 27.33)	.423
Continuously married (ref)	.				.096
Age	.	0.96 (0.92; 1.01)	.111	.	.493
Primary education	.	– ^d		.	.544
Vocational/High school	.	– ^d		.	
University degree (ref)	.			.	
Disease – Yes	.	1.94 (0.62; 6.06)	.253	.	2.63 (0.58; 11.94)
Disease – No (ref)	.			.	.209
Social network	.	0.99 (0.95; 1.04)	.763	.	.976
					.876

^a The reference category is: Never diagnosed and no symptoms of depression at the time of the survey

^b R² – Nagelkerke's r-square with p value from Likelihood Ratio Test of model fitting

^c OR (95%CI) – odds ratio with 95% confidence interval

^d OR and p value are not calculated for this category

^e P_W – Wald Chi-square test p value (model 1)

^f P_W – Wald Chi-square test p value (model 1d)

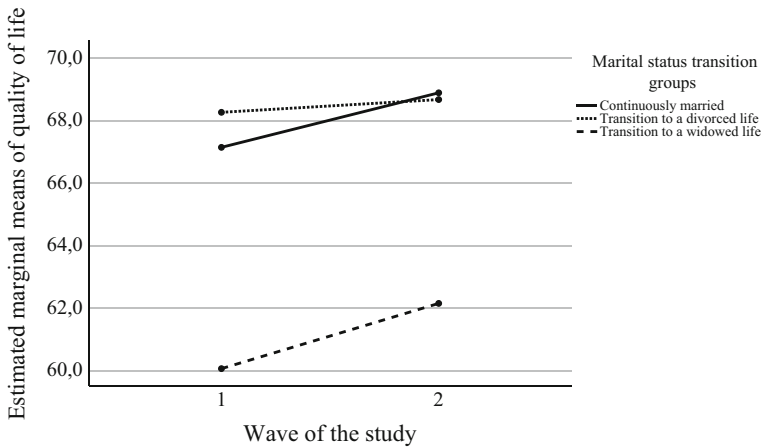


Fig. 2 Health –related quality of life for marital status change categories (unadjusted model)

Discussion

This longitudinal study examines the relationship existing between marital status transition considered as a stressful life event, physical and mental health, as well as health-related quality of life among Polish females and males based on the first and the second wave of the COURAGE–Poland population survey. The main objective of our research was to find out the extent of the impact the marital status transitions such as divorce/separation or widowhood have on physical and mental health, as well as on health-related quality of life compared to married/cohabiting people, whose marital status has not been changed. Additionally, we wanted to check whether marital status transition has different effects among females and males in the context of their physical and mental health as well as the reported HRQoL.

In the context of disability assessment used as a factor of general health, it could be stated that it is much higher among those transitioned to a widowed life compared to

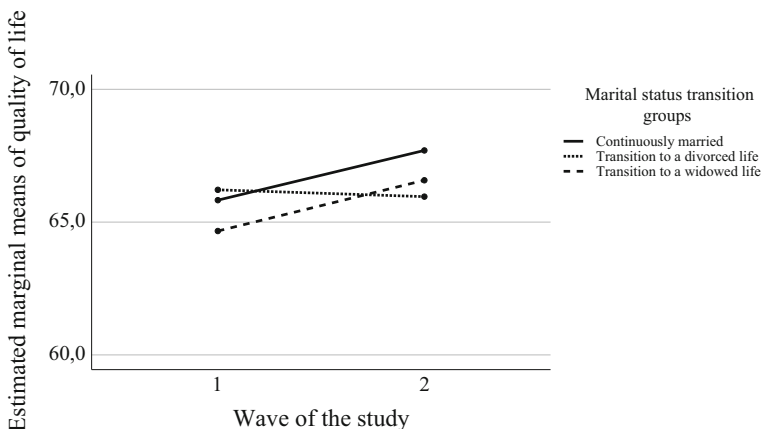


Fig. 3 Health –related quality of life for marital status change categories (fully adjusted model). Covariates appearing in the model are evaluated at the following values (at baseline): Age = 56.72; Social network = 68.90

Table 6 Results of analysis of variance mixed effects of health- related quality of life

ANOVA mixed effects				
Model number	Factor / Interaction	Type of effect	F	p
1	MSC	BSE	14.50	<.001
1a	MSC	BSE	15.34	<.001
	Gender	BSE	2.88	.090
1b	MSC	BSE	3.28	.038
	Gender	BSE	0.60	.440
	Age	BSE	140.78	<.001
1c	MSC	BSE	1.82	.163
	Gender	BSE	0.09	.761
	Age	BSE	34.42	<.001
	Education level	BSE	53.37	<.001
	Diagnosis of disease	BSE	65.14	<.001
1d	MSC	BSE	0.58	.560
	Gender	BSE	0.01	.925
	Age	BSE	26.12	<.001
	Education level	BSE	55.94	<.001
	Diagnosis of disease	BSE	65.03	<.001
	Social network	BSE	47.51	<.001
	Number of wave	WSE	6.10	.014
	Number of wave * Social network	WSE	10.99	.001
2	MSC	BSE	17.62	<.001
	Gender	BSE	11.48	.001
	MSC * Gender	BSE	4.44	.012
2b	MSC	BSE	5.65	.004
	Gender	BSE	4.27	.039
	MSC * Gender	BSE	4.36	.013
	Age	BSE	140.33	<.001
2c	MSC	BSE	3.45	.032
	Gender	BSE	3.36	.067
	MSC * Gender	BSE	3.20	.041
	Age	BSE	34.85	<.001
	Education level	BSE	51.55	<.001
	Diagnosis of disease	BSE	65.80	<.001
2d	MSC	BSE	2.29	.102
	Gender	BSE	4.15	.042
	MSC * Gender	BSE	4.12	.017
	Age	BSE	26.49	<.001
	Education level	BSE	54.01	<.001
	Diagnosis of disease	BSE	66.07	<.001
	Social network	BSE	49.33	<.001
	Number of wave	WSE	5.38	.021
	Number of wave * Social network	WSE	10.42	.001

Table 6 (continued)

		ANOVA mixed effects		
3	MSC	BSE	0.58	.558
	Age	BSE	36.69	<.001
	MSC * Age	BSE	1.15	.318
4	MSC	BSE	4.82	.008
	Education level	BSE	18.65	<.001
	MSC * Education level	BSE	0.48	.752
5	MSC	BSE	8.83	<.001
	Diagnosis of disease	BSE	28.26	<.001
	MSC * Diagnosis of disease	BSE	0.17	.845
6	MSC	BSE	0.15	.858
	Social network	BSE	17.50	<.001
	MSC * Social network	BSE	0.07	.929
	Number of wave	WSE	7.56	.006
	Number of wave * Social network	WSE	6.08	.014

MSC Marital status change categories (Transitioned to a divorced life, Transitioned to a widowed life, Continuously married)

BSE Between-subjects effect

WSE Within-subject effect (only significant given in the table)

F – value of test statistics

the other two MSC categories in both waves of the survey. However, the effect of marital status change on disability assessment turned out to be not significant among those who transitioned to a divorce/separation, and those who transitioned to a widowed life. In accordance with the Williams and Umberson's (2004) study, our research shows that the higher rate of disability assessment characterizes older respondents regardless of MSC category according to the notion that the older suffer physically more than younger people because of the ageing process. Gender in the interaction with marital status change is not significant in terms of the disability assessment which is inconsistent with previous research that claims that marital disruption influences the physical health of men more than women (Lee and DeMaris 2007; Williams and Umberson 2004).

We found a relationship between the marital status and mental health. In the analyzed sample, the odds of getting depression considered as a mental health factor is more than 5 times higher among those transitioned to divorce/separation and more than 2 times higher among those widowed than among those continuously married. These results are in line with the hitherto findings suggesting that the dissolution of a union tends to negatively affect mental health (Amato 2010a; Lamb et al. 2003; Simon 2002; Wilcox et al. 2003). These findings are also consistent with previous Polish research that show worse mental health of divorced and widowed people compared to those married (Rydzewski 2010; Tobiasz-Adamczyk 2009). A possible explanation of the results received could be the statement according to widowhood, using Pearlin's terminology (Pearlin 1989), which is considered as a life event stress, which as

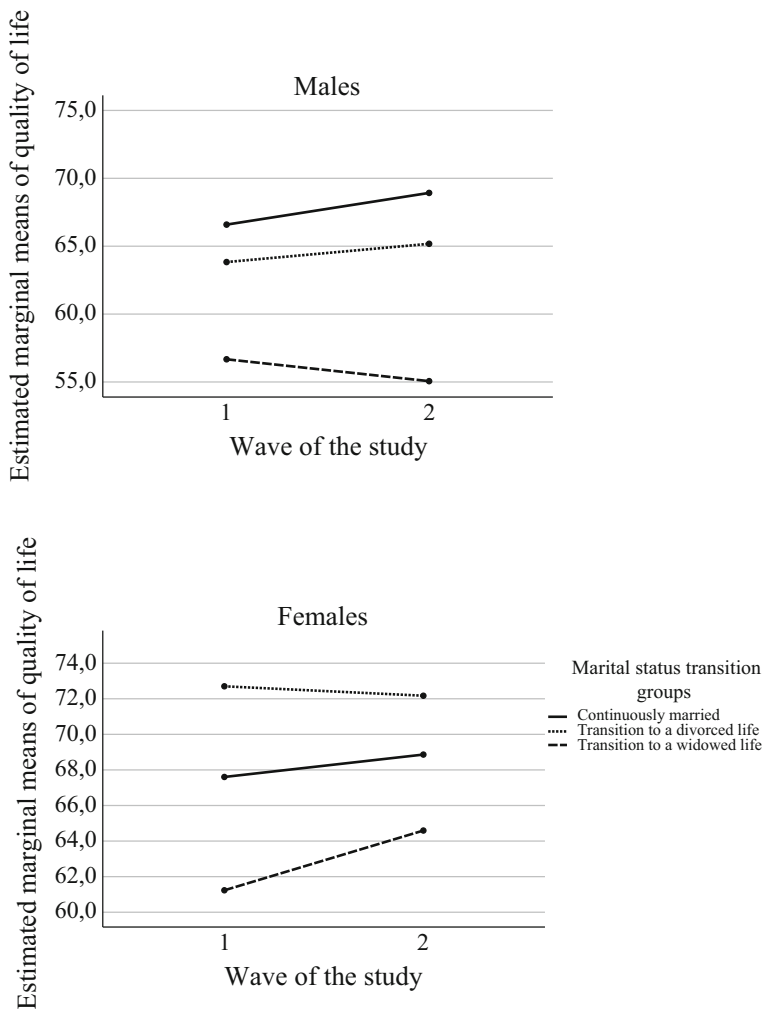


Fig. 4 Health –related quality of life for marital status change categories - males and females for the model with interaction, without adjusting

previous research stated, people generally recover over time (Lee and DeMaris 2007; Wilcox et al. 2003), whereas divorce is regarded as a chronic strain that leads to the loss of resources provided by marriage (Williams and Umberson 2004). Chronic strain tends to have stronger effects on health than a life event since it constitutes a stressful burden that continues over time (Turner 2003). In this perspective, sustained chronic strains, for instance, an economic hardship experienced by divorced people could lead them to the permanent decline in mental health and depression.

In addition, transitions out of marriage exert gender-specific effects on the occurrence of depression. The odds of getting depression among females transitioned to a divorced life was more than 5 times higher compared to their continuously married counterparts. In the case of men, the odds of getting depression turned out to be significantly higher (6 times) among those who transitioned to a divorced life and even

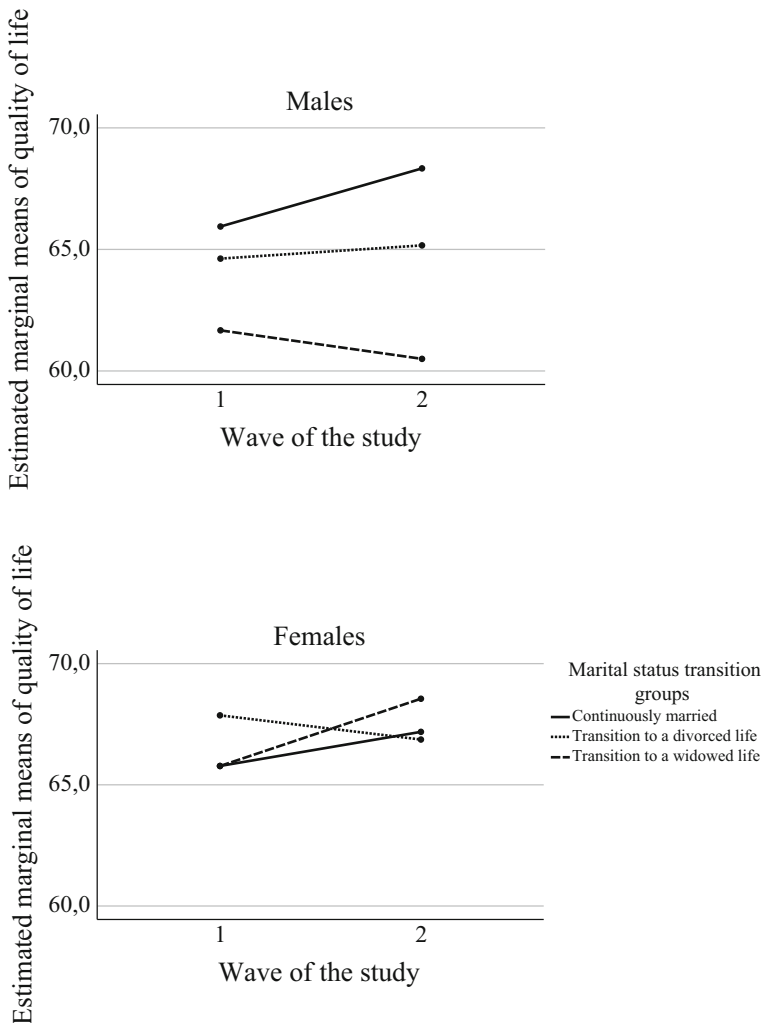


Fig. 5 Health –related quality of life for marital status change categories - males and females for the model with interaction, fully adjusted. Covariates appearing in the model are evaluated at the following values (at baseline): Age = 56.72; Social network = 68.90

slightly higher among those who transitioned to a widowhood compared to continuously married males. These results support the shock theory stressing the impact of stress associated with widowhood and divorce (Birch 1997; Bruce and Kim 1992; Holmes and Rahe 1967). Our findings also indicate on the correlation according to which measures of mental health among divorced females and males are in general comparable, which is consistent with previous research (Amato 2010). The acknowledged differences among widowed females and males could be explained by referring to previous research according to which men are more vulnerable to depression following widowhood than women. The main reason for this may be provided by social role theory. According to this, greater social deficits for men after becoming

widowed and also not having assistance in household management cause their emotional and social isolation (Johnson and Wu 2002; Ross 1995). In turn, women maintain more non-marital relationships which, in the case of a traumatic life event such as widowhood, prevent them from getting depressed (Miller et al. 1998; Umberson et al. 1992). These differences might also be explained by findings according to which many women are their ill husband's caregivers, therefore widowhood might have reduced the mental strain associated with caring for a dying spouse or anticipatory loss (Wilcox et al. 2003).

The analysis of the collected data allows us to conclude that marital status change seems to have a significant connection with the reported health-related quality of life. Higher rates of HRQoL among those continuously married compared to those divorced and widowed groups have been noticed. Furthermore, continuously married people with chronic disease declared a higher rate of health-related quality of life than those who transitioned to a widowed life, which indicates the protective effect of being in a union during stressful times. However, unlike what was found for depression, the HRQoL rate for those to-be-widowed and to-be-divorced women and men did not significantly change along with marital transitions.

In the 1st wave of the survey, as is showed in the simple model, both to-be-divorced females and males have not been characterized by a significantly different quality of life rate compared to their married counterparts. In contrast, to-be-widowed males and females had significantly lower rates of HRQoL compared to those married because, as we may assume, they were living with ill spouses and perhaps had to care for him or her. After consideration of covariates the results turned out to be not significant. These outcomes were consistent with previous studies that show this relation (Chipperfield and Havens 2001; Naess et al. 2015).

Based on the results presented in the simple model, after marital status change, as could be expected, our findings showed that widowed men and women had a significantly lower quality of life than those continuously married. This relationship concerning widowed and continuously married males turned out to be significant even in a fully adjusted model. It is also worth mentioning that in the 2nd wave, as has been showed in the simple model, divorced females were characterized by a higher HRQoL rate than their continuously married counterparts. As Gustavson et al. (2012) stated, change into divorce/separation could be considered as a positive for individuals from highly-troubled relationships because remaining in it negatively affects life satisfaction. To-be-divorced females were likely to be living in an unhappy marriage, therefore the dissolution of the union could even be a positive change for them. Moreover, the increasing level of social acceptance for divorce in the case of fraught marriage is the consequence of the secularization process occurring in Western European societies. These trends have also emerged in Polish society because currently one out of three marriages established in Poland lead to divorce (Demographic Yearbook of Poland 2017). This finding also supports the previous Polish research according to current Polish society becomes more and more similar to societies in Western Europe in terms of rate of divorce (Szukalski 2013). Although divorce rate in Poland is still lower compared to Western societies, Szukalski (2013) predicts that in next years would become probably the same because of globalization processes and very strong will of the vast majority of Poles to live like Western Europeans. On these tendencies indicates an increasing number of cohabitations

among Polish people nowadays which is consistent, as Szukalski (2013) states, with social processes already occurred in Western societies. However, our results are inconsistent with other Polish study suggesting lower life satisfaction and well-being among divorced people compared to those married, regardless of their gender (Rydzewski 2010). The lack of significant difference in terms of HRQoL among those divorced and continuously married men and even a higher rate of health-related quality of life among divorced females compared to married women could indicate that divorce might be no longer perceived in Poland as a harmful occurrence, at least to some extent. In this context, our findings seemed to be inconsistent with previous research according to which the lower life satisfaction of divorced people compared to those continuously married is caused by selection effects (Gustavson et al. 2012; Naess et al. 2015).

Our study clearly shows that females transitioned to widowhood report better health-related quality of life than their male counterparts. This correlation has also been observed among women transitioned to a divorced life compared to their male counterparts (the difference is significant only before marital status change). Considering all MSC categories, the lowest rate of HRQoL has been noticed among males transitioned to a widowed life in both waves of the survey. These findings are consistent with the results of other studies according to which marital relationships seem to be more rewarding for men than for women (Chipperfield and Havens 2001; Naess et al. 2015). The differences might be interpreted by way of three reasons proved by previous research. Firstly, men usually view their spouse as their only close confidant, therefore widowhood caused by the loss of this close person may decrease their emotional well-being (Chappell 1989). Secondly, wives tend to receive support from close friends or children, whereas husbands are supported predominantly by their wives (Antonucci and Akiyama 1987). Thirdly, unlike men, women tend to create and maintain social networks providing social support during stressful times which consequently eases the trauma experienced (Taylor et al. 2000).

The education level seemed to be a significant factor in the context of health-related quality of life. Among all MSC categories, HRQoL increases with the increasing level of education, however the interaction of MSC with the education level turned out to be insignificant. Our findings indicate that the highest rates have been noticed among those continuously married and transitioned to a divorced life obtaining university diplomas or higher degrees, whereas the lowest are among those transitioned to a widowed and continuously married status having only a primary level of education. These results could suggest that the education level is a more important factor in terms of the reported HRQoL rather than the transition out of marriage.

The current study indicates that there are differences in the case of HRQoL between the different age categories of respondents, albeit they are not significant either. It could be stated that the lower health-related quality of life has been declared by the oldest respondents transitioned to a widowed life, as well as those transitioned to a divorce (65–79 and 80+) compared to those continuously married which could be explained using socio-emotional selectivity theory (Carstensen 1992). As marriage becomes more salient for older people, exiting from it causes significant decline in the personal quality of life. In contrast, the highest rate of HRQoL has been noticed among the youngest respondents (18–49) in each marital status change category.

Limitations and Future Directions

It could be stated that the large randomly selected sample from the general population that allows interaction analyses focusing on different socio-demographic factors, such as age and level of education, as well as the exploration of the two waves of the survey turned out to be the strong point of our research. Moreover, the health-related quality of life perspective which has not been previously explored with relation to marital status change and taking account of both physical and mental health factors are further attributes of our research.

Nevertheless, there are some limitations regarding this study. There are three most important. Firstly, the relatively small number of respondents included in the marital status change groups, secondly, the high drop-out rate between the waves of the survey. The analysis of attrition for this study has shown that individuals who were married or cohabited at baseline and participate in both waves were younger than the second group but there were no significant differences in relation to gender, level of education and self-reported health status. Third limitation concerns the possibility of unmeasured selection effects. Fourthly, the limitation of our study refers to the fact that the explorations were conducted only in two waves, thus we could not check the long-term effects caused by the marital status transition on health and HRQoL which should be considered in future research. Fifthly, we did not have access to the marital history of our respondents whereas, as research shows, there exists a correlation between the accumulated married years and the health status according to which, more years spent in marriage could ease health risks after marital status change (Barrett 2000; Dupre and Meadows 2007).

Future research should also consider the quality of explored relationships because leaving less beneficial unions, regardless of divorce or widowhood, could have an impact on the reported health-related quality of life after transition out of marriage (Gardner and Oswald 2006). Furthermore, we have not considered the influence of secondary stressors such as, for instance, the decline in income or relocating which could take place during marital status change. It is also worth mentioning more factors of physical and mental health in future explorations with relation to transition out of marriage. Despite these potential limitations, our study sheds light on the influence of transition out of marriage on physical and mental health, as well as the reported HRQoL outcomes in future explorations among Polish females and males, while also contributing to current research concerning this subject.

Conclusion

In sum, it appears that our results are more consistent with the social causation paradigm. In terms of mental health, especially the existence of depression, the social causation paradigm seemed to be useful because transition out of marriage/cohabitation was strongly connected with the higher rates of depression occurrence. This particularly refers to men and women transitioned to a divorced life, as well as widowed men because the odds of getting depression among these groups were much higher compared to their continuously married counterparts. However, the lack of significant change in the case of disability assessment among those transitioned to a divorce/separation, as well as to widowhood

compared to continuously married contrasts with the social causation model. In the case of HRQoL, the social causation paradigm could especially explain significantly lower rate after marital transition among widowed males compared to their continuously married counterparts. Nevertheless, significant change in the HRQoL rate has not been observed statistically between the 1st and 2nd wave of the survey among both men and women transitioned to a widowed and a divorced life.

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Compliance with Ethical Standards

Conflict of Interest No conflict of interest.

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